

REMARKS

I. Status of Claims

Claims 51-100 are pending. No amendments are being submitted with this response. Accordingly, claims 51-100 remain pending in the application for examination of the merits.

II. Rejections Under 35 U.S.C. § 103(a)

A. Weber in view of Tokumoto

The Examiner rejects claims 51-62, 65-67, 72, 73, 76-79, 81, 82, 84, 85, 88-91, 93, 94, 96, 97, and 100 under 35 U.S.C. § 103(a) as being unpatentable over Weber (U.S. Patent No. 4,602,052) and further in view of Tokumoto (JP 11-116653). May 29, 2007, Office Action at 2. In particular, the Examiner alleges that "Weber teaches the use of any quaternary ammonium salt (Column 4, Lines 20+)," and "preferred embodiments hav[e] multiple nitrogen atoms (Column 5, Lines 1-40)." *Id.* at 2. The Examiner, however, concedes that "the claimed ammonium salt is not expressly disclosed in the preferred embodiments," but argues that "said ammonium salt represents a known ammonium salt that has been previously used in elastomeric compositions, as shown for example by Tokumoto (Abstract, Paragraph 10, and Equation 1, n=0)." *Id.* at 3.

Applicants respectfully traverse this rejection because the Examiner has failed to establish, as required by M.P.E.P. § 2143, a *prima facie* showing of obviousness. Several basic factual inquires must be made in order to determine the obviousness or non-obviousness of claims of a patent application under 35 U.S.C. § 103. These factual inquiries, set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 U.S.P.Q. 459, 467 (1966), require the Examiner to:

- (1) Determine the scope and content of the prior art;
- (2) Ascertain the differences between the prior art and the claims in issue;
- (3) Resolve the level of ordinary skill in the pertinent art; and
- (4) Evaluate evidence of secondary considerations.

The obviousness or nonobviousness of the claimed invention is then evaluated in view of the results of these inquiries. *Graham*, 383 U.S. at 17-18, 148 U.S.P.Q. 467.

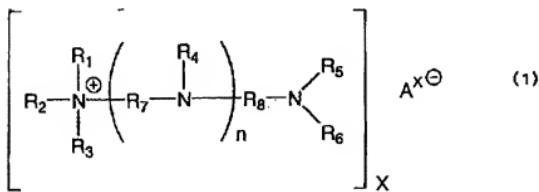
Thus, in order to carry the initial burden of establishing a *prima facie* case of obviousness that satisfies the *Graham* standard, the Examiner must at least show (1) that the prior art reference teaches or suggests all the claim limitations, (2) that there is some suggestion or motivation, either in the reference or in the knowledge generally available to one of ordinary skill in the art, to modify the reference, and (3) that there is some reasonable expectation of success. See M.P.E.P. § 2143. The Supreme Court, in its recent decision in *KSR Int'l Co. v. Teleflex, Inc.*, recognized that a showing of "teaching, suggestion, or motivation" could provide helpful insight in determining whether the claimed subject matter is obvious under § 103(a). 127 S. Ct. 1727, 1740-41, 82 U.S.P.Q.2d 1385, 1396 (2007).

The Examiner emphasizes that "Weber suggests the use of any quaternary ammonium salt and more particularly, describes preferred embodiments having two nitrogen atoms." May 29, 2007, Office Action at 3 (emphasis in original). The Examiner concludes, therefore, that one skilled in the art "would have found it obvious to use any of the known quaternary ammonium salts, especially those having two nitrogen atoms, such as those described by Tokumoto." *Id.* The Examiner further notes "that the quaternary ammonium salt described by Tokumoto is extremely similar to those detailed

in Weber (Column 5, particular (II))." *Id.* Applicants respectfully disagree with the Examiner's characterization of Weber and Tokumoto.

In particular, there is no motivation to combine the salt of Tokumoto with the process of Weber.

First, Weber does not teach or suggest the use of the quaternary ammonium salts of the claims or of Tokumoto, so there can be no motivation to substitute salts. In those instances where Weber teaches the use of salts with more than one nitrogen atom (column 5), Weber expressly teaches that each nitrogen atom is positively charged, which is consistent with the formulary calculation for the anion radical, J. This is contrary to Applicants' claims. As seen in claim 52, the required salt comprises a quaternary amine with a positive charge and a tertiary amine that has no charge (the non-ionic nitrogen atom described in the specification as-published (U.S. Patent Application Publication No. 2006/0155077 A1) at ¶ [0014]). This is also contrary to Tokumoto, which also requires at least one nitrogen atom without a charge.



While Applicants agree that Weber teaches that Formula II is a preferred quaternary ammonium salt, Formula II, however, is merely one of five general quaternary ammonium salts that are preferred. Weber, col. 4, lines 67-68 ("Preferably, the quaternary ammonium salt has a structure of formula I, II, III, IV or V."). Moreover, Weber teaches that the most preferable quaternary ammonium salt is Formula I, not

Formula II. *Id.*, col. 7, lines 7-9 ("Most preferably, the quaternary salt is of Formula I, wherein Z is zero, R₃ and R₄ are methyl radicals, R₅ and R₁₀ are tallow radicals."). Also, as noted above, the Examiner stresses that the preferred salt embodiments have two nitrogen atoms, but Formula I, the most preferred salt, has only one nitrogen atom when Z is zero, as suggested by Weber. *Id.*; *see also* Examples 1-49, 67-69 (using dimethyl ditallow ammonium chloride, a salt having only one nitrogen). Thus, while one skilled in the art might consider using a quaternary ammonium salt of Formulas I, II, III, IV, or V, that person would have been more likely motivated to use a salt of Formula I with only one nitrogen and would not have been motivated to use the two nitrogen salt of Formula II.

Second, Weber and Tokumoto use their respective salts in completely different fields of use, so there is no motivation to select the salts of Tokumoto and/or to substitute those salts for those salts of Weber. The Examiner incorrectly argues that Applicants' claimed salt "represents a known ammonium salt that has been previously used in elastomeric compositions, as shown for example by Tokumoto (Abstract, Paragraph 10, and Equation 1, n=0)." May 29, 2007, Office Action at 3. While Weber is directed to the use of quaternary ammonium salts as **couplers** in elastomeric compositions, Tokumoto is directed to the use of quaternary ammonium salts as **catalysts** for the reaction to form polyurethane and polyisocyanurate foams. *See* U.S. Patent No. 6,307,102 ("the '102 patent") at Abstract (English-language relative to JP 11-116653 attached hereto). Thus, the salts of Tokumoto may be used to create certain polymeric foams, but there is no evidence that such compounds are suitable for inclusion as catalysts in Weber's elastomeric compositions, let alone for use in tires; the concepts are wholly unrelated.

Accordingly, a person of ordinary skill in the art would not have been motivated to make the necessary selection and combination.

Third, the Examiner's argument that "there would have been a reasonable expectation of success in forming the composition of Weber with the ammonium salt of Tokumoto" because "the quaternary ammonium salt described by Tokumoto is extremely similar to those detailed in Weber (Column 5, particular (II)) and it is described as being usable in elastomeric compositions used in the automotive industry" is specious. In particular, one would not have been motivated to combine the salt of Tokumoto with the rubber composition of Weber because the nature of the problems to be solved is different. Tokumoto emphasizes that the salt has a structure that is "effective in improvement of flowability and in uniformization of density distribution by accelerating the initial stage of foaming reaction, being effective in improving fire retardance, having a low volatility to give less odor." '102 patent, col. 3, lines 42-51. In contrast, the problem Weber allegedly solves is replacing the carbon black filler, at least in part, with a quaternary ammonium salt due the "increases in the prices of petroleum products in general, and carbon black in particular." Weber, col. 1, lines 30-36. Further, the mere fact that Tokumoto notes that the salt can be used in create a foam suitable for automobile seats and steering wheels ('102 patent, col. 7, lines 54-55) would not suggest to a person of ordinary skill in the art that the salt can be combined with a diene elastomer nor does it mean that it can be used in a tire. With such differences, a person of ordinary skill in the art would not have had any reasonable expectation of success. Moreover, a person of ordinary skill in the art would not have any reasonable expectation of success for using a catalyst for foam, as per Tokumoto, as the coupler for elastomeric compositions, as per Weber.

Because neither Weber nor Tokumoto would have motivated one skilled in the art (1) to select the claimed salt, and (2) to insert in the process of Weber, as required by M.P.E.P. § 2143.01, and would not have provided a reasonable expectation of success for this combination, a *prima facie* case of obviousness has not been established and Applicants respectfully request that the Examiner withdraw this rejection for independent claims 51, 76, and 88, which all recite the claimed quaternary ammonium salt, and the dependent claims thereon.

Finally, the Examiner fails to recognize the unexpected results obtained by the present invention. Specifically, Examples 4-9 demonstrate that the use of an ammonium salt of formula (I) as a secondary accelerator in a sulfur-vulcanized diene rubber composition results in high vulcanization rates without impairing mechanical properties (both static and dynamic). *See* Specification as-published at ¶ [0141]; compare Examples 7-9, which contain an ammonium salt of formula (I), with comparative Example 4, which contains the secondary accelerator DPG (N,N'-diphenylguanidine, the secondary accelerator most widely used in the industry).

In addition, Examples 7-9, which contain an ammonium salt of formula (I), result in superior performance compared with comparative Example 6, which contains Bardac® LF-80 (diocetyl dimethyl ammonium chloride), a quaternary ammonium salt encompassed by the general formulas of Weber, instead of an ammonium salt of the claimed invention. In particular, the abrasion resistance for Examples 7-9 (85.1, 84.4, and 76.0) is far superior to that of Example 6 (100.7).¹

¹ DIN abrasion resistance is expressed as the amount of abraded rubber under testing conditions, and the lower the value the better the abrasion resistance.

The Examiner, however, states that "a comparison between the claimed ammonium salt and Bardac® is not persuasive because it is unclear if Bardac® is an ammonium salt having an additional, non-ionic nitrogen atom or if it is a conventional ammonium salt having four hydrocarbon groups." May 29, 2007, Office Action at 7. Contrary to the Examiner's contention, however, Applicants note that the specification indicates the exact structure of Bardac® LF-80. *See* Specification as-published at ¶ [0132]. Moreover, Applicants attach the data sheet for Bardac® LF-80 provided by the manufacturer Lonza, Inc., which confirms that the comparative product has a structure corresponding to, for example, formula (II) of Weber when Z is zero, R₃ and R₄ are methyl, R₅ and R₆ are octyl, and J is Cl. *See* Lonza, Inc. Data Sheet for Bardac® LF-80 (attached hereto).

Thus, the examples of the claimed invention also demonstrate that the Examiner has not established a *prima facie* case of obviousness and Applicants respectfully request that the rejection be withdrawn.

B. Weber in view of Tokumoto and further in view of Yamaguchi

The Examiner rejects claims 63, 64, 80, and 92 under 35 U.S.C. § 103(a) as being unpatentable over Weber and Tokumoto as applied in claim 51 above and further in view of Yamaguchi (U.S. Patent No. 6,550,508). May 29, 2007, Office Action at 5-6. Applicants respectfully traverse this rejection because Yamaguchi fails to provide the necessary motivation and reasonable expectation of success to select the claimed quaternary ammonium salt and to combine it with a diene elastomer that Weber and Tokumoto are lacking. Thus, Applicants respectfully request that the Examiner withdraw this rejection for at least this reason.

C. Weber in view of Tokumoto and further in view of Vasseur

The Examiner rejects claims 68-71, 83, and 95 under 35 U.S.C. § 103(a) as being unpatentable over Weber and Tokumoto as applied in claim 51 above and further in view of Vasseur (U.S. Patent No. 7,199,175). May 29, 2007, Office Action at 6. Applicants respectfully traverse this rejection because Vasseur fails to provide the necessary motivation and reasonable expectation of success to select the claimed quaternary ammonium salt and to combine it with a diene elastomer that Weber and Tokumoto are lacking. Thus, Applicants respectfully request that the Examiner withdraw this rejection for at least this reason.

D. Chauvin in view of Tokumoto

The Examiner rejects claims 74, 86, and 98 under 35 U.S.C. § 103(a) as being unpatentable over Chauvin (U.S. Patent No. 6,982,050) in further in view of Tokumoto. May 29, 2007, Office Action at 6-7. The Examiner notes that Chauvin discloses a composition comprising a vulcanization system containing, among other things, at least one vulcanization amine activator selected from, among other things, quaternary ammonium salts. *Id.* (citing Chauvin, col. 3, line 58 – col. 4, line 24). The Examiner, however, concedes that Chauvin “fails to list specific types of said salts,” but argues that “the claimed class of ammonium salts is known and more particularly, have been used in elastomeric compositions in the automotive industry.” *Id.*

Applicants respectfully disagree and traverse. Chauvin, like Tokumoto, fails to provide the requisite motivation under M.P.E.P. § 2143.01 to choose the claimed salt from the vast number of possible quaternary ammonium salts because it provides no preference for any particular salt. In fact, Chauvin provides even less of the necessary

disclosure than Weber. Applicants respectfully request that the Examiner withdraw this rejection for at least this reason.

E. Chauvin in view of Tokumoto and further in view of Lucas

The Examiner rejects claims 75, 87, and 99 under 35 U.S.C. § 103(a) as being unpatentable over Chauvin and Tokumoto as applied in claims 74, 86, and 98 above and further in view of Lucas (U.S. Patent No. 5,681,874). May 29, 2007, Office Action at 7. Applicants respectfully traverse this rejection because Vasseur fails to provide the necessary motivation and reasonable expectation of success to select the claimed quaternary ammonium salt and to combine it with a diene elastomer that Chauvin and Tokumoto are lacking. Thus, Applicants respectfully request that the Examiner withdraw this rejection for at least this reason.

Conclusion

In view of the foregoing remarks, Applicants respectfully request reconsideration of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our Deposit Account No. 06-0916.

Respectfully submitted,

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GARRETT & DUNNER, L.L.P.

Dated: August 27, 2007

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Attachment: U.S. Patent No. 6,307,102

Lonza, Inc. Data Sheet for Bardac® LF-80